

FAQ

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A background image showing several construction workers wearing white hard hats and safety glasses, gathered around a table and looking at large sheets of paper, likely blueprints. The image is slightly faded to allow text to be read over it.

What Is Commissioning?


Commissioning is a systematic process of verifying and documenting that building systems or subsystems perform interactively according to the design intent and the owner's operational needs. Ideally, the process should begin with the design phase and last at least one year after project closeout, and include training of operations and maintenance staff.

ASHRAE Guideline 1-1996, The HVAC Commissioning Process, defines commissioning as the process of ensuring that systems are designed, installed, functionally tested, and capable of being operated and maintained to perform in conformity with the design intent. Commissioning begins with planning and includes design, construction, start-up, acceptance and training, and can be applied throughout the life of the building.

What Is Recommissioning?

Recommissioning is a confusing and often misused term. Technically, recommissioning can occur only if a building or system had been previously commissioned. It is applied periodically to bring the performance of the building systems back to design or current operating requirements.

ASHRAE Guideline 1-1996 defines post-acceptance commissioning as the continued adjustment, optimization, and modification of the HVAC system to meet specified requirements. It may be utilized on any facility that has previously been commissioned consistent with the guideline, and



includes updating documentation to reflect minor setpoint adjustments, system maintenance and calibration, major system modifications, and provision of ongoing training of operations and maintenance personnel.

What Is Retrocommissioning?

Retrocommissioning is applied to buildings that have never gone through any formal type of commissioning or quality assurance process (or the original commissioning or quality assurance may have been so poorly performed as to be nonexistent for all intents and purposes). Existing problems with the performance of systems are identified and corrected to the original design intent or the current desired system performance. The extent of retrocommissioning to be performed will depend on the operating condition of the equipment, current needs of the owner, and the budget.

For More Information...

The **Publications** section of this CD-ROM contains a number of online reports, papers, and other data that provides commissioning related information in much greater detail.



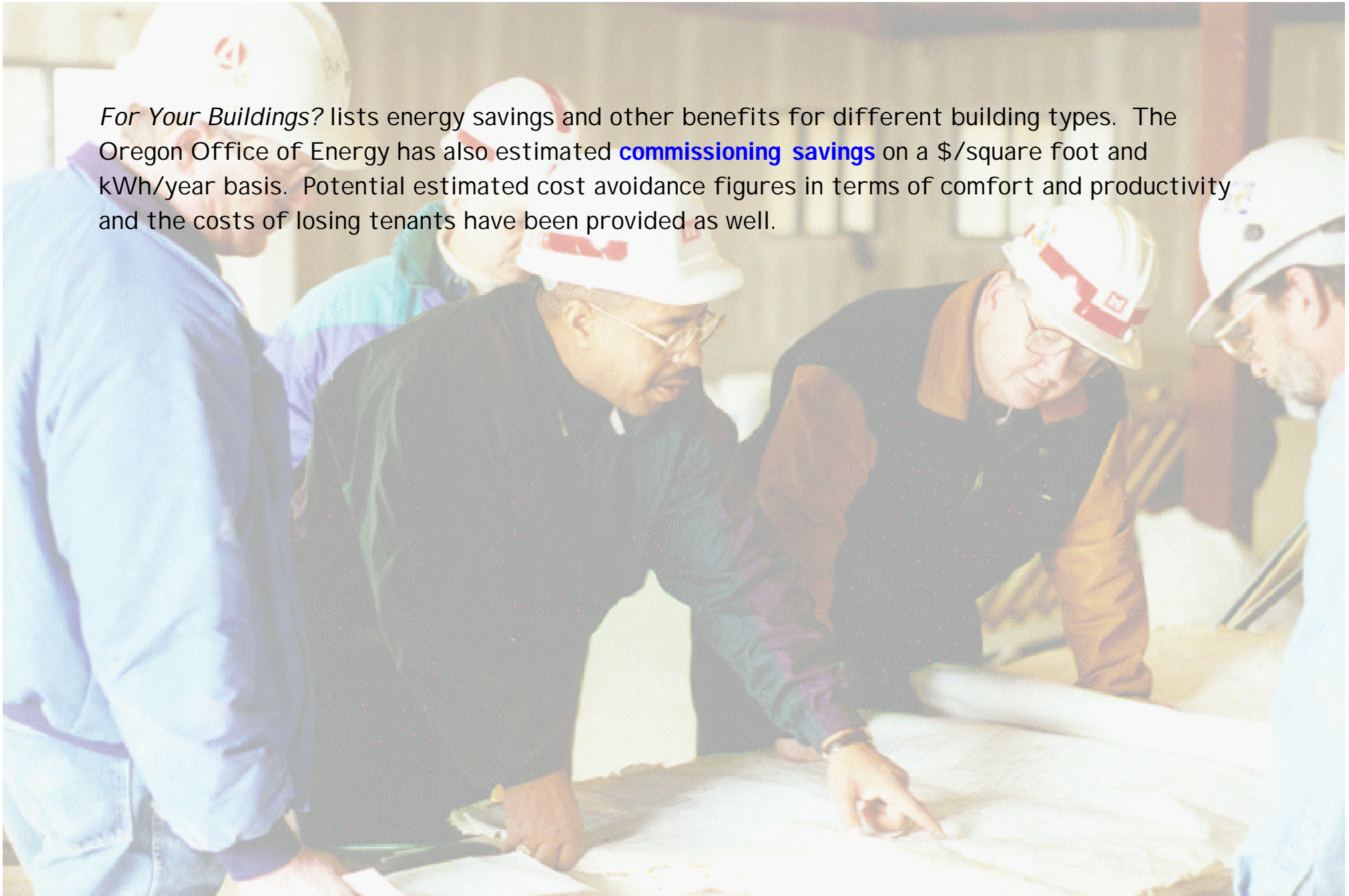
How Much Does It Cost?

As with savings, information about the “exact” costs of commissioning is lacking. Defining an exact cost for commissioning services is difficult due to the unique nature of each building project. The number of cost-contributing factors depends on the size and complexity of the project, and the willingness of the owner to invest in the appropriate commissioning process. It is possible, however, to estimate a range that commissioning costs will fall within. A number of studies have been done on identifying commissioning costs on various types of construction projects. Portland Energy Conservation, Inc.’s booklet *What Can Commissioning Do For Your Buildings?* lists cost ranges and median costs for different building types. The Oregon Office of Energy has also estimated **commissioning costs** on a percentage and square foot basis.

How Much Can It Save?

As with costs, information about the “exact” savings of commissioning is lacking. Defining an exact saving for commissioning services is difficult due to the unique nature of each building project. Besides the potential quantitative savings in terms of dollars, hard to measure qualitative savings in terms of improved productivity, better indoor air quality, avoidance of litigation, etc. probably also exist. It is possible, however, to estimate a range that commissioning savings may fall within. A number of studies have been done on identifying commissioning savings on various types of construction projects. Portland Energy Conservation, Inc.’s booklet *What Can Commissioning Do*

For Your Buildings? lists energy savings and other benefits for different building types. The Oregon Office of Energy has also estimated **commissioning savings** on a \$/square foot and kWh/year basis. Potential estimated cost avoidance figures in terms of comfort and productivity and the costs of losing tenants have been provided as well.



What Steps Are Involved?

Commissioning can include a variety of different steps and elements, but in general, five main phases make up a comprehensive commissioning process:

Program

Design

Construction

Acceptance

Post Acceptance

For each phase of commissioning, keep in mind that every construction project is unique. The objectives and tasks described for each phase are not reserved only to that phase, but may in fact occur in a preceding or following phase, as the situation may require.



A photograph of four construction workers wearing white hard hats and safety glasses, gathered around a table to review large architectural blueprints. The workers are dressed in work clothes, including blue and dark jackets. The background shows a construction site with wooden framing.

Program Phase

This initial phase may well be the most important one as it sets the ground rules that will be followed. The owner's requirements and budget are identified, the composition of the project team is defined, and the team member with authority to coordinate the commissioning process is identified. The objectives during the program phase are to:

- a. Document the owner's requirements
- b. Select the commissioning authority
- c. Identify and assign responsibilities
- d. Document the initial design intent
- e. Begin development of the commissioning plan
- f. Begin compilation of the systems manual

A basis of design document is prepared that defines how the intent will be achieved in practice, and includes all necessary information including weather data, interior environmental criteria, other pertinent design assumptions, cost goals, and references to applicable codes, standards, regulations, and guidelines.

A background image showing four construction workers wearing white hard hats and safety glasses, gathered around a table to review large architectural blueprints. The workers are focused on the documents, with one pointing at a specific area. The setting appears to be an office or a construction site's planning area.

Design Phase

The design of the building, including all components and systems, is finalized during this phase, and the design is reviewed in accordance with the basis of design. Specifications and contract documents are prepared, and the commissioning plans and specifications are also finalized. The objectives during this phase are to:

- a. Document the design intent as it evolves
- b. Continue development of the commissioning plan
- c. Develop the commissioning specification
- d. Prepare contract documents that clearly reveal, describe, and fulfill the design intent
- e. Review and accept contract documents for compliance with design intent
- f. Coordinate other mechanical, electrical, fire safety, and life safety service requirements with HVAC layout, equipment, and systems

The commissioning specifications will detail the commissioning process, identify responsibilities and requirements of each member of the commissioning team, and detail the scope of work for all participants, including contractors, vendors, and the project manager. The specifications also identify the skills and qualifications of all members of the commissioning team.

A background image showing four construction workers wearing white hard hats and safety glasses, gathered around a table and looking down at a large set of blueprints. The scene is indoors, likely a construction site or office, with a wooden wall and windows visible in the background.

Construction Phase

All systems and components are installed, tested, and put into operation during the construction phase. The construction phase's objectives are to:

- a. Review submittals
- b. Finalize details of the commissioning plan
- c. Conduct periodic commissioning team meetings
- d. Observe construction, installation, start-up, operation, and testing and balancing
- e. Conduct O&M training

The commissioning plan is modified to reflect changes that were made to equipment and components during construction, as well as changes in responsibilities within the commissioning team. The components and systems are tested and certified for readiness for commissioning, operations and maintenance information and warranties are obtained for all components and equipment, and field inspections are undertaken regularly to assure that the construction complies with the documentation. Of major importance, but often minimized or ignored is the last objective, training. Because the training of building operators is usually left to the last moment before occupancy in new buildings, contractors and designers have overwhelming incentives to spend as little time and resources as possible on this task. The problem is that without proper information transfer, the performance of the building will be limited to the highest capabilities of the building operators.

A photograph of four construction workers wearing white hard hats and safety glasses, gathered around a table to review large architectural blueprints. One worker in the center is pointing at a specific section of the plans. The background shows a construction site with wooden framing.

Acceptance Phase

A substantially complete building is turned over to the owner during this phase. The commissioning process' objectives during this phase are to:

- a. Verify the accuracy of the final TAB report
- b. Verify that the HVAC system complies with the contract documents
- c. Establish an as-built record of the HVAC system performance
- d. Complete the as-built records
- e. Complete the commissioning report
- f. Complete the systems manual
- g. Turn over the building to the owner

Verification, functional performance tests, and other acceptance procedures are performed to verify that the total integrated performance of all components, equipment, and systems meet the design's overall performance objectives.

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Post Acceptance Phase

Actions during the occupancy or post acceptance phase are intended to respond to the changes that occur over time through the normal use and operation of a building. The objective here is to maintain the performance of the components, equipment, and system throughout the useful life of the facility in accordance with its *current* design intent. Functional performance tests are used to verify the seasonal operation of all components, equipment, and systems. Established procedures are followed to document and record changes in use, equipment, occupancy over time, and user feedback.